~~Southern Nigeria~~

~~M. Dalziel~~ 1936

~~dupl ms~~

16 to 17

Various notes about

Cultivated plants. etc.

Plants / which seeds

are desirable for bird

Begonia. macrolata : large stem leaves,
pink flowers. Brazil

coccinea hybrids : Brazil

~~Manicata~~ ? scabrous, succulent

heracleifolia hybrids

semperflorens Brazil

on B. Rajah S. Chron. III : 16.213-

B8-3/3

St. T G 39A

Memo

From

Date,.., 193 .

To

Hedges

Podocarpus gracilior

—— polystachyus

Malpighia coccigera

Streblus

Ehretia

Acalypha siamensis

Triphasia

Bougainvillea spp.

Duranta

? Turnera aurantiaca

Tecomaria capensis

Justicia betonica

Brunfelsia (blue) [illegible]

Bessie Chapman
Clara d'Escofet
Colombia
Crusader
Hoosier Beauty
La France
Lord Charlemont
Martha Drew
Mrs Chas Lamplough
Mrs H.R. Darlington
Souvenir de Claudius Pernet
——— Georges Pernet
Rev. F. Page Roberts
Dame Edith Helen
Admiration
America
Capt. F.S. Harvey - Caml.
Claire Goodacre
Dean Hole
Earl Haig
Edel
George C. Waud
Lady Ashtown

Mme Abel Chatenay
Mabel Turner
Mme Segond Weber
Mrs Henry Morse
Mrs Ronald d'Escofet
Victory

Shirley's selection
of tried roses

Shirley Times 2.11.31

B2-3/5

T

G 39

MEMORANDUM

From	*To*

In last months (62 days) 6 Ty – 70d. 407 cars : average nearly 7.

In 4 months (6 Ty – 7 Sa.) = 120 days

1 car	18 hrs	9400
2 cars	7 hrs	8454
		2884
3	4 hrs	1014
		1549
		9986
1	5 hrs	2218
8+	3 hrs	

T

G 39

MEMORANDUM

From	*To*
Hydrangeas.	

Jpw. Jones. cuttings from blue plants.

12 pots. all heat. each & compost (50:50)

4 pots no heat : blue

4 pots steamed : pink

4 pots 1 c.l. sand. fertilizer. blue

Growing Plants Without Soil.

****

In the last few years Hydroponics or "dirtless farming" has become front page news in America. Hydroponics (from Greek words meaning water and labour) is a new term invented in 1936 by men who had perfected ways of growing plants in water and not in soil; they labour with water, and not with dirt. Dr. W.F. Gericke was the pioneer of the method. After a series of careful experiments, dating from about ten years ago, he had remarkable results, producing many kinds of plants of very large size, and heavy crops of tomatoes, from shallow tanks of water. American newspapers heard of this, and Dr. Gericke had an embarrassing amount of publicity. Companies were promoted for popularizing the method by selling the necessary equipment to the public. The result has been some extravagant claims as to the simplicity and effectiveness of hydroponics. There is no doubt that when carefully managed the method has great possibilities , but it is not a short road to easy success. It is interesting and instructive, and something new for most people, and it has appealed to the popular imagination. But the method is not a modern discovery. Its history goes back a century, to the first scientific work on the nutrition of plants.

Plants take part of their food from the air through their leaves, and part from the soil through their roots. From the air they take carbon dioxide, and with the energy from sunlight build this up (by combination with water) into carbohydrates: sugars, starch, cellulose, etc. This action on the part of plants was first demonstrated about the end of the 18th century, when modern chemistry began. It was then known that roots absorbed water from the soil, and with the water certain salts in solution, but no observations were made on the precise requirements of the roots until about 1840.

The soil on which ordinary roots live is a mixture of very complex substances. The water in the soil gradually dissolves some of the simpler substances, and these are taken up by the roots with the water. In order to simplify the study of this process, scientists devised methods of growing plants without soil. They used two methods. One was to use washed sand instead of soil; this sand contained no more soluble substances. The plants growing in the sand were given certain salts dissolved in the water used to water them. But as it is difficult to wash sand so thoroughly that it contains no soluble substances, a more sensitive method was to grow the plants with their roots in pure distilled water, to which weighed amounts of various substances were added. In this way it was possible to find what elements a plant needed for its growth, and in what kind of proportions. This method of water culture has been used by plant physiologists for a century past to study the nutrition of plants, so that hydroponics is no new thing. Hydroponics is the application of the water culture idea to the practical purpose of growing plants for use.

By means of the water culture method, it was soon established that the following elements are necessary for plant life: carbon, hydrogen, oxygen, nitrogen, potassium, calcium, phosphorus, magnesium, sulphur, and iron. It was later discovered that other elements were also needed in smaller quantities, and the number of these gradually increased as methods improved. These elements of which only minute amounts are needed are called "trace elements"; different plants differ in their demands of them. The elements are given to the roots combined in the form of simple salts. Various mixtures of such salts are possible.

The plant can also tolerate other elements which are not on the "essential" list, and it is sometimes convenient to use these; for example, in one of the mixtures quoted below, calcium is given in the form of calcium chloride, though the plant does not need chlorine.

In preparing a solution for the water culture method, it is usual to take first the salts which are required in relatively large amounts, and dissolve these in the full quantity of water required. Then to this are added small quantities of stock solutions containing the trace elements. The trace element solutions are made as follows:

A.	water	half a gallon
	boric acid	1 teaspoonful
	manganese sulphate	1 teaspoonful
	zinc sulphate	1 teaspoonful

After dissolving the above, add 1/8 teaspoonful copper sulphate.

B.	water	1 pint
	ferric chloride	$\frac{1}{4}$ teaspoonful

Two teaspoonful of solution A and 4 teaspoonsful of solution B are added to five gallons of the main culture solution just before use.

The main culture solution may be made up as follows. To five gallons of water add the following salts (measured dry):

monopotassium phosphate	$1\frac{1}{4}$ teaspoonsful
calcium nitrate	4 do.
magnesium sulphate	$\frac{1}{2}$ do.
ammonium sulphate	$\frac{1}{2}$ do.

An alternative combination of salts is as follows:

monopotassium phosphate	1 teaspoonful
sodium nitrate	1 do.
magnesium sulphate	$2\frac{1}{2}$ do.
calcium chloride	1 do.

It should be noted that both calcium nitrate and calcium chloride absorb water rapidly from the air and must be kept in tightly stoppered bottles.

But it is not merely necessary to give plants the right salts in the right proportions. The solution must have the right degree of acidity, and this may vary somewhat for different plants. Also, as the roots take up some of the dissolved salts, the acidity may change and need correction. This is not ordinarily necessary when plants are grown in soil, as the soil has a stabilizing effect. Another and still more important fact is that roots need air as well as water. Ordinary soil provides air in the spaces between the soil particles. Water will dissolve air, but not very much; and the warmer the water the less air it will hold. Therefore it is necessary to have some method for aerating the water in which the roots are to grow.

The procedure then for growing plants by the hydroponic method is to make up your solution as above specified, and put it into suitable vessels (the size naturally varies with the size and number of plants you wish to produce). Earthenware vessels must be used , as metals corrode and may upset the balance of the solution. The top of each vessel must be covered with wire netting, and on this is placed a layer of moss, fern roots, or some other fibrous material to hold the seeds or young plants in position. The seeds are planted in the layer of moss (which is kept moist) and as soon as they germinate their roots enter the water, there

finding all the nutrients they need. As the roots absorb water, more must be added to maintain the level correct. The water must also be aerated as often as necessary, and its acidity maintained at the right value.

By this means, under ideal conditions, the roots have all that they need, in exactly the right proportions, and growth is therefore vigorous and rapid. No soil diseases or pests are present to harm the roots. By suitable tests, the quantity of nutrients in the water can be maintained constantly correct, so that the development of the plant proceeds unhindered. Ideally, the method should in fact produce perfect plants of maximum size. In practice there are found to be certain difficulties, some of which have been indicated above. Another is the fact that the nutrient solution is an ideal medium for the growth of algae, the microscopic water plants that turn ditchwater green. These can fairly effectively be dealt with by keeping the water shaded from light; green algae cannot grow in the dark. There are however other microscopic organisms that can grow in the dark and may cause complications: bacteria, protozoa, etc. These should be controllable by cleanly methods.

So far as local experiments have gone, they show that proper aeration of the water is the chief difficulty. Mechanical aerating devices, such as those used in large aquaria, may meet this need. For some plants, blowing air through the water occasionally with a bicycle pump may be enough, but others seem to need more. The acidity question is said not to be serious if the solution is changed from time to time as it becomes exhausted. It is probable that many plants can be grown by this process with quite simple equipment by the ordinary person interested in gardening, but for larger undertakings the method probably offers more difficulties, which will only be discovered and corrected by full scale experiments.

It is possible that the method will in time be developed for general use in the commercial production of fresh vegetables of many kinds, and for cut flowers, as has already been done in various places in America. But it is certain that conditions will have to be very carefully controlled by scientific methods; like most improvements of technique, hydroponics needs greater knowledge and skill for its effective use.

But he would be a rash man who would prophesy the future of horticulture. Besides the salts and the trace elements above mentioned, biochemists are now beginning to understand the functions of hormones or growth-promoting substances, minute quantities of which have a profound influence on the behaviour of plants. It is possible that the existence of these in natural manures may account for the advantage of the latter over artificial fertilizers. Perhaps the really effective use of hydroponics may have to wait for a fuller understanding of these more subtle needs of the growing plant.

There are some good books on Hydroponics, ~~all~~ chiefly published in America. One of the first was "Soilless Growth of Plants" by Ellis & Swaney (Reinhold Publishing Corporation, New York, 1938). Later books are "Growing Plants in Nutrient Solutions" by Turner & Henry (John Wiley & Sons, New York, 1939) and "Soilless Culture Simplified" by A. Laurie (McGrew-Hill Publishing Co. Ltd., 1940). A newly published work by Dr. W.F. Gericke, originator of the method, called "The Complete Guide to Soilless Gardening" has been published this year by Putnam & Co., London, price 12/6.

Ellis & Swaney: Soilless Growth of Plants. Reinhold Publishing Corp. 1948 pp. 144 - 146

Stock Solution A.

In ½ gallon of water are simultaneously dissolved 3.2 grams (1 teaspoonful) each of boric acid (H_3BO_3), manganese sulphate ($MnSO_4.7H_2O$) and zinc sulphate ($ZnSO_4.7H_2O$). To this solution ⅛ teaspoonful of copper sulphate ($CuSO_4.5H_2O$) is then added if desired. Stock Solution A may be added to culture solutions (see later) at any time before use.

Stock Solution B.

Dissolve 0.8 gram (¼ teaspoonful) of iron (ferric) chloride ($FeCl_3$) or nitrate ($Fe(NO_3)_3$) in 1 pint of water. Ferrous sulphate ($FeSO_4.7H_2O$) may be used as a source of iron but has a greater tendency to precipitate from solution before use. Ferric citrate, though it dissolves slowly, remains in solution much better than does the sulphate. As iron has a tendency to precipitate in contact with culture solutions, Stock Solution B should only be added immediately before use with plants.

In using any of the culture solutions described hereinafter, Stock Solution A may be added in the proportion of 10 cc. (2 teaspoonfuls) to each 5 gallons of culture solution if pure chemicals are used, or in the proportion of 5 cc. (1 teaspoonful) to each 5 gallons of culture solution if commercial-grade chemicals are employed in preparing the latter.

Stock Solution B should be added to culture solutions just before actual use in the proportion of 20 cc. (4 teaspoonfuls) of B to each 1 gallon of the culture mixture.

Under certain conditions (bright days) iron may be used up very fast by plants. Therefore, if any signs of iron chlorosis (see Chapter Seven) appear. additional iron should thereupon be added.

FORMULA I. - Fertilizing Salts for Culture Solution.

Recommended and Used by the N.J. Agricultural Experiment Station.

Unit of Measure	Fertilizing Salt: Monopotassium Phosphate KH_2PO_4	Calcium Nitrate $Ca(NO_3)_2.4H_2O$	Magnesium Sulphate $MgSO_4.7H_2O$	Ammonium Sulphate $(NH_4)_2SO_4$ (Dry)
Grams per 5 gallons of solution	5.9	20.1	10.7	1.8
Teaspoonfuls per 5 gallons of solution (approximate	1¼	4	2½	½

Each of these chemical salts is dissolved separately in about a pint or quart of water, their solutions mixed, and then diluted with water to 5 gallons. For trace elements, Stock Solutions A and B are added as directed.

The inclusion of ammonium sulphate in Formula I is stated to be beneficial in maintaining the pH value of the solution within a smaller range during the life of the solution.

B8-3/12

FORMULA II. - Composition for Culture Solution.

Developed by the N.J. Agricultural Experiment Station.

Unit of Measure	Fertilizing Salt: Monopotassium Phosphate KH_2PO_4	Sodium Nitrate $NaNO_3$	Magnesium Sulphate $MgSO_4.7H_2O$	Calcium Chloride $CaCl_2$ (Dry)
Grams per 5 gallons of solution	3.9	6.4	10.3	3.2
Teaspoonfuls per 5 gallons of solution (approximate)	1	1	$2\frac{1}{2}$	1

Each salt is dissolved separately, then mixed and diluted to 5 gallons. Trace elements are added to Formula II in the same manner as to Formula I.

B8-3/13

Gardenia. florida var. Kew 93/34

Vigorous shrub, now 6 ft. high & very spreading producing many flowered shoots which become arrested at early stage of development — and so persist.

One flower opened 4.11.39. Diameter when full open was 3½ inches (9 cm.). Truly double.

Calyx Very turbinate 2 cm long incl Sepals 2.1 cm long laterally compressed, nearly 4 mm wide near base, apex falcate acute

B8·3/14

Ladies' Committee, Po Leung Kuk

YORK HILL,
SINGAPORE.

November 3, 1939.

Dear Sir:

I am directed by the Ladies Committee of the Po Leung Kuk to thank you for the loan of the 30 pots of palms used at their At Home on the 28th of last month and deeply appreciate your kindness.

Yours faithfully,

Hon. Secy.

The Director,
Botanic Gardens,
Singapore.

T

G 39

MEMORANDUM

From

To Dr Warren

pl. see attached. The wording is rather unwieldy at times but I think it's intelligible. Do you think part of it might be abstracted for MATHA magazine?

12-9-57

B8·3/15

Cultivation of
Medium type Chrithanthemum

From catalogue of Chrysanthemum Show
organized by
Sukokai Association
Tokyo, 1935.

Translation by Y. Kimurayashi, Tokyo

Cultivation of medium type Chrisanthemum.

Secret for Cultivation

In regard to the distinction of medium type chrisanthemum, Mr Nakayama, well known Japanese among the Chrisanthemum cultivators, has kindly remained in this paper. Generally the people are still thinking that the cultivation of medium type chrisanthemum is very difficult as the horticultural art in past time was kept in very secret (was not spread out) and the people were very ignorant of the habit of medium type chrisanthemum. When we know its habit, this cultivation should be very easy. In fact, our Shikokai Association has spread every research and experience to the public.

Habit of medium type Chrisanthemum.

The medium type chrisanthemum is comparatively easy to grow and germination is more vigorous than the large type chrisanthemum. The stem is slender and very long, but not weak. The leaves are narrow thin and keeping well on the stem. The appearance is more dignity than that of large type chrisanthemum. Size of the flower is medium and 7" – 8" at present. The flower looks comparatively very large as the growth is smaller. Its flowering seems to be late in all but it is not really. The flower keeps for very long period for the appreciation from "blossom down" to "embrace in". People call "blossom down" for beginning of flowering and "embrace in" for all petals stand up and start to the peculiar movement (not like clasping each others at soon after blossom down) until the "embrace in" from "blossom down" needs about 10 – 15 days.

BB 3/17

Full blossom of the large type Chrithamemum and small type Chrithamemum mean 'blossom down" only, but the medium type chrithamemum means both periods, blossom down and embrace in.

Dividing root-

The time of dividing root is generally in the end of November or beginning of December. But the large growth of 200 flowers should be finished by middle of Novenber and Cultivate in the glass or hot house.

Sereection of young shoot

It should not take the large shoot. The best one is the smalls which are at far from the mother tree. The large shoot is often attacked with the disease and the flowers come out at soon after dividing. moreover the growth cease sometime.

Nursery

In case of it is kept 10 — 20 kinds of preserving shoots, generaley is used the box of 3"—4" deep. After plant it 2" distance in its' box Keep under the shelter. But when it is kept very many kinds of shoot, it should be made the nursery. After plant its shoots at 3" distance, build the shelter with The grass or straw to prosect for the frost. The shelter should face to south and made higher at front. The three directions of east, west, north are closed. The surface of soil is covered with 1" straw in 1" thickness.

Manuring in nursery

The dividing shoot should plant in the sterile soil. In fatile soil its shoots are often rotten. Generally, manuring in the

nursery is not so much needed. When the plants are poor, it would be better to apply twice some very weak liquid manure between beginning and middle of march. Liquid manure applying. manuring is as following.

Oil Cake	4/5 parts
water	4 Gallons

Mix both above oil cake and water and keep it mutual rate. When its rotten, take the upper water. dilute it 3 times water and then apply.

Dividing root and Bud Cutting :

In the past time, it was employed dividing root because, there it is easier to employ bud cutting when it need us to have so many branches for a plant. Viz, bud cutting is employed upto 12 branches in 1'2" pot. and dividing root is in case of more than 12 branches.

To make 100 - 200 flowers. the dividing root should be Cultivated in the hot house or plan from previous year. For less than 30 flowers, divide the root in previous year and plant it in 5"-6" pot in the end of April.

The plants from dividing root shoot out so many branches. Therefore, bud Cutting is employed generally for the plant of 12 - 24 flowers.

The time for bud Cutting is about 12th April and the beginning and middle of may for 6 - 7 branches.

Method and Soil of Bud Cutting

The soil for bud Cutting should be very light one as known. without the manures. It is planted the Cutting shoots of 2" - 3" in 2" - 3" distance in the pot or box and after sufficient watering

keep under the shelter. It is strictly forbidden to expose in the sun shine for 4 – 5 days after cutting done and expose gradually in very soft sun. But rain is very needed in some time.

Cutting should be done during early morning or in cloudy weather.

If we want the cutting perfectly, take its soil and knead it with the water, then stick that soil on half below of cutting shoot to prevent such as swinging.

Pinching

Pinching is very implant for not only increasing number of the branch but for regulation of the plant's shape. Therefore, some shoots are pinched shorter and some are pinched longer. After all, the pinching should be done as the branches shoot out roundly like its pot.

The good time of pinching is that the shoots are easy take to separate off easily with the fingers. First pinching act at 2½" – 3" from the soil. So that, after soon that young plant grow to 4" and the bud in side shoot out strongly. Then, select 4 – 5 shoots from those many shoots. When those 4 – 5 shoots have grown, the second pinching should carry out. Second pinching, act at the point of 4 leaves on the top shoot and the others are also pinched to form a good shape of plant by the proportion for its pot. Third pinching, act at the point of 2 leaves on the top shoot and the others should be pinched in the same meaning for the shape of plant. After third pinching, if it get the desirable number of branch, the pinching should be stopped.

The suitable time for pinching is between 5th July, so

it should be pinched by 5th of July.

Above mentioned way of pinching are normally employed for 1'— 1½" pot. For large pot first pinching should be carried out at 5" from the soil and after that the shoots are pinched at the stage of 4 – 6 leaves.

Arrangement of Branch.

The branches which got after pinching, pull towards with the hook to weed expose in the sun shine. After harvest the spent plant in regular 1'— 1½" pot in August. Keep 10 – 15 branches. Though the system of 12 branches is most common in 1'— 1½" pot would keep the spare branches for the losing the insect, disease should be so. It is needed to help those branches with the stick by which the branches have grown.

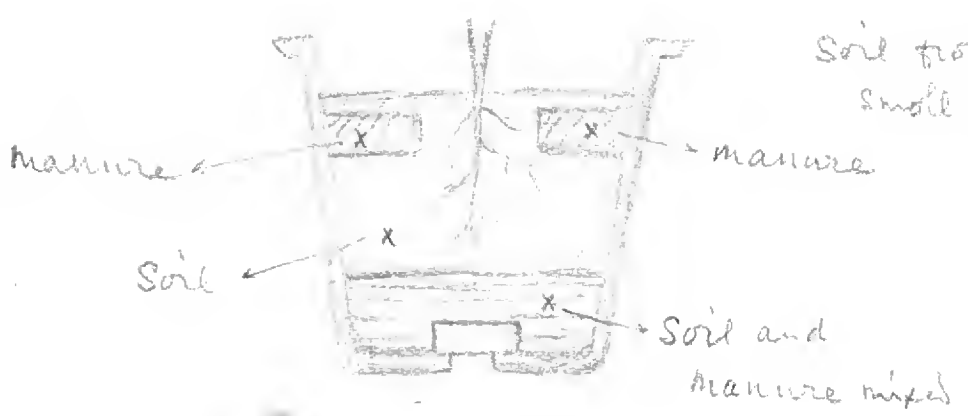
Cultivation of young plant.

The plants form cutting or dividing root in previous year should plant in the small pot before planting required large pot. In ideal way, it is planted in the small pot in the first year in the next, plants in the medium pot. Finally, plant it in the required pot.

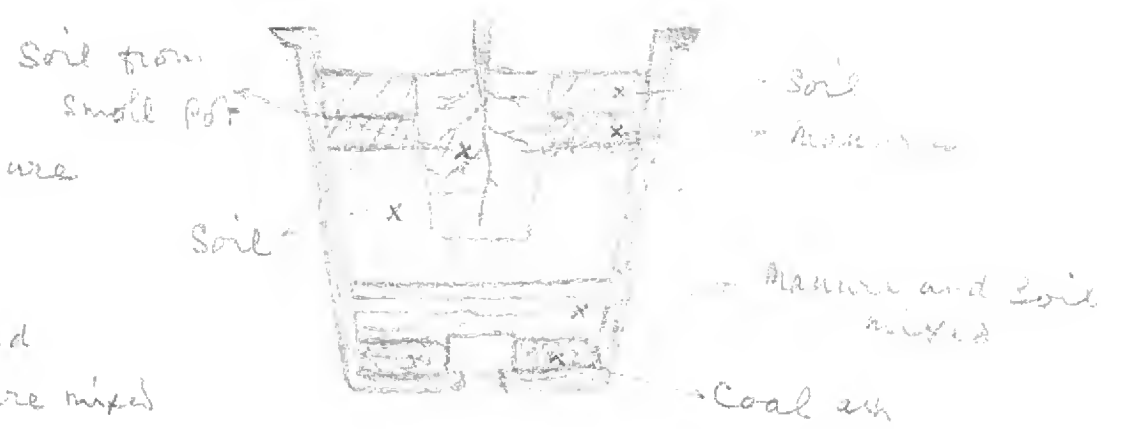
Treatment of young plant in small pot.

The size of small pot is 5"—7". Good time of planting in the small pot is in April for the dividing root in previous year and in soon after it's root came out for the cutting. The young plant planted in the small pot, it can see the white root out of pot hole in it's bottom in 20 – 30 days time. This time is best to change that young plant in to the medium pot.

The size of medium pot is 8" for 1' of the required pot and 9"—1' for 1'2" of the required pot.



Planting young plant in small pot.



Planting young plant in medium pot.

Regular planting

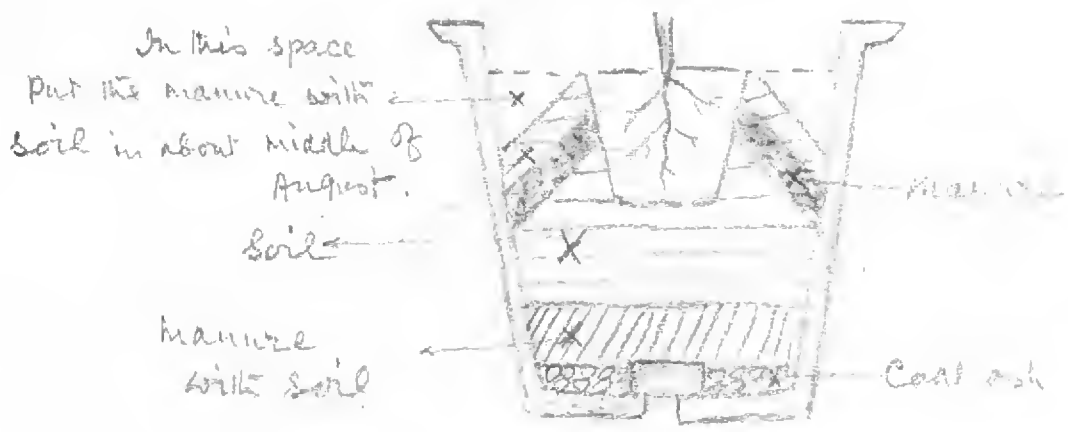
(Proper planting)

The young plants in the medium pot are removed in the regular large pot in about middle of August. But for the young plants removed in the regular pot from the small pot directly, should give the manure in this time.

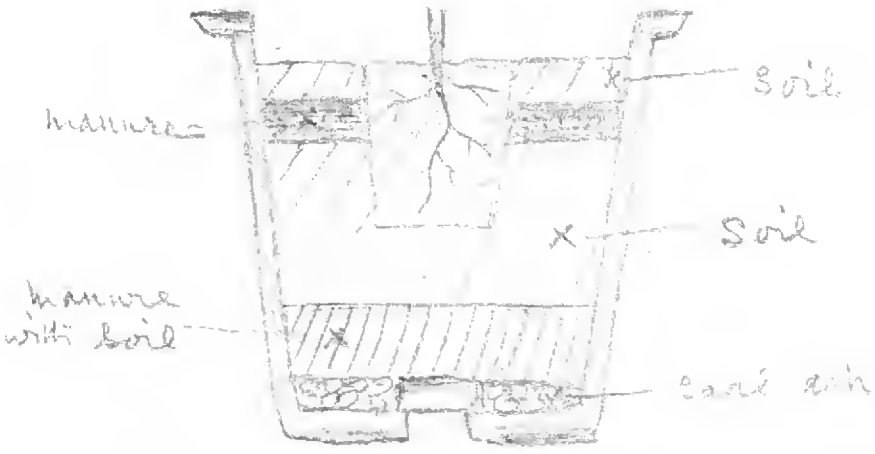
In case of removing the young plant in the regular pot from the small or medium pot, 1, Put the coal ash in the bottom of regular pot. 2, Put the soil with the manure on it. 3, put only the soil on it and remove the young plant with its pot soil from the small or medium pot. 4, Put the soil in it again until 4/5 of the pot soil with the young plant from the small or medium pot buried. 5, Put the manure in without it touching the root of young plant and finally, fill the soil until the pot soil with the young plant covered.

The coal ash in the bottom of the pot contain a lot of the potash and very good for draining.

In removing the young plant, it should be better to take it with that pot soil without smash by knocking at the edge of the pot and push out from the bottom hole with the fingers or stick.



Remove young plant in the regular pot from the small pot.



Remove young plant in the regular pot from the medium pot.

B 8·3/23

Soil

The soil generally using is very soft humus mixed field soil. Most simple way to make such a compost is following. First of all, dig two pits at the corner of the field and put in it the leaves, weeds, dust, straw cut in 4" and the rubbish of vegetables with pouring water occasionally.

The time digging out this compost should be in december and sift with ½"–1" sieve to get out the rubbish. It should not use too fine sieve.

The soil should be well dry by exposing sun to destroy insects.

Dried soil sift out with very fine sieve and get out powder soil. This powder soil should not use, unless otherwise prevent the draining and air, finally lead root rotten.

Manure

It is used both dry manure and liquid manure. But dry manure is more safety, more convenient and efficacious.

Combining dry manure

Oil pressed herring	2/3 lbs
Oil pressed colza (rape-seed)	2 lbs
Soya bean oil cake	2 1/3 lbs
Rice bran	4 1/6 lbs
field Soil	2 ½ gallons

After mix perfectly these things with spreading water from the syringe little by little until the moisture is well over, keep in the box and press well over, let it ferment. In this case the water should

not in too much. fermentation would finish in 3 weeks time. In the summer, about 10 days.

Simple way of Combining dry manure.

oil pressed rape seed	1/5 gallon
Rice bran	4/5 "
field soil	2 1/2 "

Manuring Quantity

maximum quantity for one pot is 1/7 gallon.

when plant in small pot --- 1/50 gallon

when plant in medium pot --- 1/20 gallon.

when plant in regular pot --- 1/14 gallon.

This is for 1'—1'2" pot and forms branches 10—14.

Ash of the wood or weeds is also important to apply with combining manure. Quantity of ash is about 10 %.

Liquid Manure

oil pressed rape seed	[illegible]
water	5 [illegible]

After perfect rotten, Take brown clear water, dilute 2 times water and then use.

The time of this manuring, Apply twice in about 2 weeks.

After applied the first, apply the second in 3 days time.

Watering

Sun shine is not very much neccesitates until late evening from early morning, It would be quite enough for 6 – 7 hours till 1 – 2 P.M. from 7 – 8 A.M.

With regard in The number of time of watering, although there are so many different opinions, It is generally thought at present once or Twice in a day.

Ideal Time of watering

Once between 10 — 11 A.M. in Spring.

Once between 8 — 11 A.M. in Summer.

11 A.M. is most Suitable time for once watering in a day. If the leaves and stem are still withering after sunset it should give water immediately and Soil of surface in pot is still wet when watering It should restrain. As matter of fact, the drying condition is much better for the plant than too wet.

The nature of water.

Soft and Clear water from water supply, well, river, rain are all good. dirty hard water is strictly prohibited. Dirty water may often grow of disease and insects. However, raining water is thought to be the most one. Cold or cool water should avoid. The temperature of water is best as the same as that of pot's soil. The best way to increase water temperature is to keep water tank in sun shine.

quantity of watering

quantity of applying water is somewhat different between Spring, Summer, Autumn and winter. It is generally thought that a suitable quantity of water as much as dropping out from the draining hole at

B8.3/25

The bottom of pot.

The Cause of falling leaves and Its' prevention.

If the cultivation is going on properly, There can not be [illegible]

what is the cause of dry leaf.

The dead leaves causes generally by disease but [illegible] by root rotten. Over manuring and water [illegible]

There are Spot leaf, Oidium, [illegible] so common disease. [illegible] diseases generally prevent by certain chemicals. Such method of its prevention will write later on.

Root rotten causes by too much water, too much manure and manure touch directly to the root.

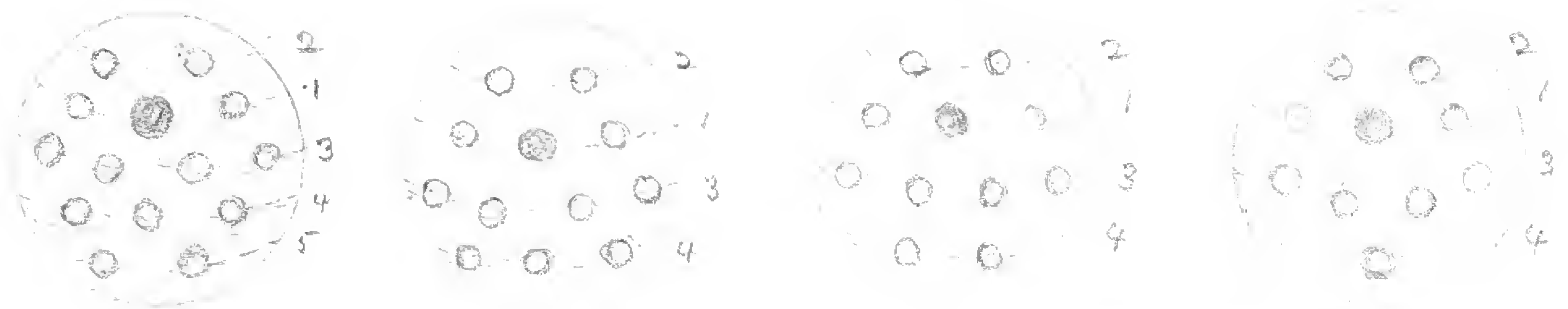
Too much manure help the [illegible] of [illegible] we apply suitable quantity of manure as [illegible] [illegible] can not be any fault.

For too much water, we should take care rain, [illegible] and water [illegible]

Bamboo Support.

In october, it must be changed temporary support to proper bamboo supports. To erect bamboo supports [illegible] for medium Chrysanthemum than that of large one, for [illegible] branches.

Method to erect bamboo support



14 Bamboo   12 Bamboo   11 Bamboo   10 Bamboo.

D.E. 3/27

Arrangement of bamboo support is illustrated on just previous page. Every branchs should not be intersected each other, therefore (therefore) it is very important to have spare branchs. Branch in Centre makes highest. Branchs in back of Center one make little smaller than Centre branch. Branch at front of Center one make just same height as back one. Then next to out side making gradually lower, therefore most out side become lowest and the shape of it looks like a hemisphere (round)

Bamboo support is recommended to paint with black enamel or other black paints as black support is graceful and let flowers look more beautifully.

Rafia is used as a thread to tie together the branch and bamboo. This thread also is recommended to stain in yellowish green.

Little longer bamboo supports are used in the first, when the flowers opened half a way, Cut off it again at just under of flower and tie together branch and supports at upper part.

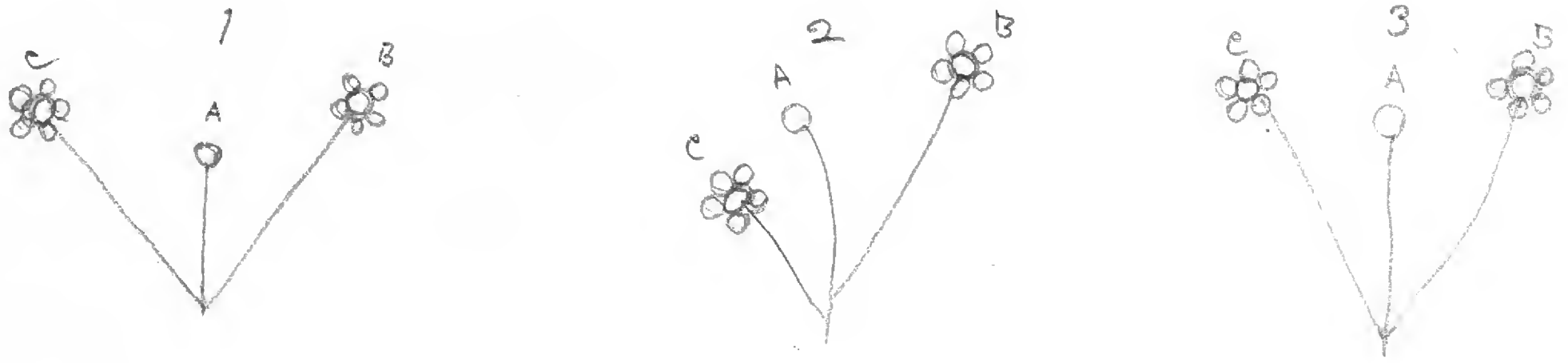
Selection of flower bud.

All medium Chrysanthemum produce the flower bud by 10th Sept. Selection of flower bud should take very much care as it is extremely important. Select same size of flower bud, the straight calyx and normal shape of bud. It make one flower on one branch by the end of Sept.

If take off it when the flower buds have grown up. the marks of bud come out very distinct and growing of buds are declined.

In next I illustrate the way of selection about the flower bud on a branch.

B.E. 3/28



The form of flower buds coming out in a branch are like that in above. One flower bud alone come out in very seldom. In August, very large bud like flower bud called Willow bud come out, it should take off as soon as it's found. Willow bud never come out after September.

In above illustration. A of 1 do not come out definitely, so that generally take off it and select large bud shape one in center of B or C to equalize those flowers.

In 2, both A and B are selectable, but in case of selecting B is better to have center bud.

In 3, it is able to choose healthy, large bud in center from any A, B, C.

Generally, select a center flower bud and all outside buds are taken off. It should take great care to take off outside bud lest it should take away selected one with others. It is taught to use best to hold the selected bud with left hand and pick off the outside buds with right hand.

Care until flowering

Protection for insects is most important. Among many insects, aphides, caterpillar and grasshopper are most harmful.

Aphides, gray and yellow green aphides are much more harmful than red aphides. This creature, mainly haunt the leaves,

stem and sometimes, invade in to the flower bud when it starts to flowering. For killing them some mixture are used in an early stage.

Caterpillar, This insect eats leaves. Stem and often, make the hole at side of flower bud. Good way killing them is to capture.

Grasshopper. Killing of this insect is also best to seize like that for caterpillar.

Watering. This is, of course, very important work. Keep soil in pot always in suitable moisture.

Before flowering, it is better for colouring of flowers to keep in out except strong windy or heavy raining whether we let take flowering started it should keep in to avoid frost, rain and night dew.

The care of flower for competition.

Many people think of excellent flowers at the competition that it would be made by hand work just like artificial flowers. But the flowers increase it's dignity, gloss and beauty on natural. On the Contrary, it make flowers very dirty and crumpled by touching hands, . Therefore. every one aim at the minimum hand touching on flowers.

The next description (items) are only necessitated to help to regulate the flowers in formal shapes.

1. It should not touch at early stage of flowering
2. If the petals started to embrace each other about 80 - 90 % it is better to help it's embrace by pressing the petals gently out side with fingers.

3. Petals which is laying down to another direction, regulate it to proper direction.
4. Help to become as "the spoon petals" slightly surround "the flat petals" which embrace each other and only "pipe petals" stretch straitly.
5. It is very important to make the flower shape is not a hemisphere but higher in the centre. If the flat petals do not develop satisfactory, the shape of flower impossible to become higher in the centre.

Extermination of a noxious insect :

Under mentions are the name of noxious insects for extermination :

Cerambycid, snipp, elephant insect, rolling leaf,
aphis, Caterpillar, hairy Caterpillar.

Snipp and elephant insect are both very tiny creatures and can't harm the bud. Generally insecticide is applied for these things.

Cerambycid harm the stem. This insect damage the stem and lay their eggs at that part. After hatching, the larva eat down the stem to near the root and harm the stem in same way again in next year. unless burn out the harmed stems and old root.

Insecticide

There are various insecticide nowaday. but it should be applied the insecticides which are effective and cheap.

1. pyrethrum and soap water mixture.

Pyrethrum. ½ — ¾ lb

Horticultural soap (soda-less 1%), Little

Mixing above pyrethrum and soap, add the little water and dissolve it in the fire. Apply after dilute 4 gallons water. This mixture has such a defect as making dirty the leaves.

2 Nicotine sulphate and soap water mixture.

Nicotine Sulphate	30 cc
Horticultural soap	1/5 lb.

Add little water to above soap, dissolve it in the fire and after dilute 4 gallons water, mix with nicotine Sulphate. Apply it with the sprayer. This mixture is very effective, stainless and comparatively cheap.

Prevention of the disease

Mainly the falling of leaves cause by the various diseases you should pluck out burn off or bury such as spotty, yellowish or rotten leaves immediatly when you found it. Appling of chemicals mixture is thought as it is easiest task and most effective. Apply before the rainy and twice by Sept.

1. Bordau mixture.

Copper Sulphate	1 lb
Lime	5/6 lb

A. Add little hot water to above Copper Sulphate, dilute 6 gallons water its solution.

B. Add hot water to above lime and after it dissolved, filter it with cotton cloth. Then dilute 6 gallons water its solution

Finally, mix above both A. B solutions at same time in another big wooden receptacle. Use the sprayer to apply.

B8·3/32

2 Copper Carbonate and Ammonia mixture.

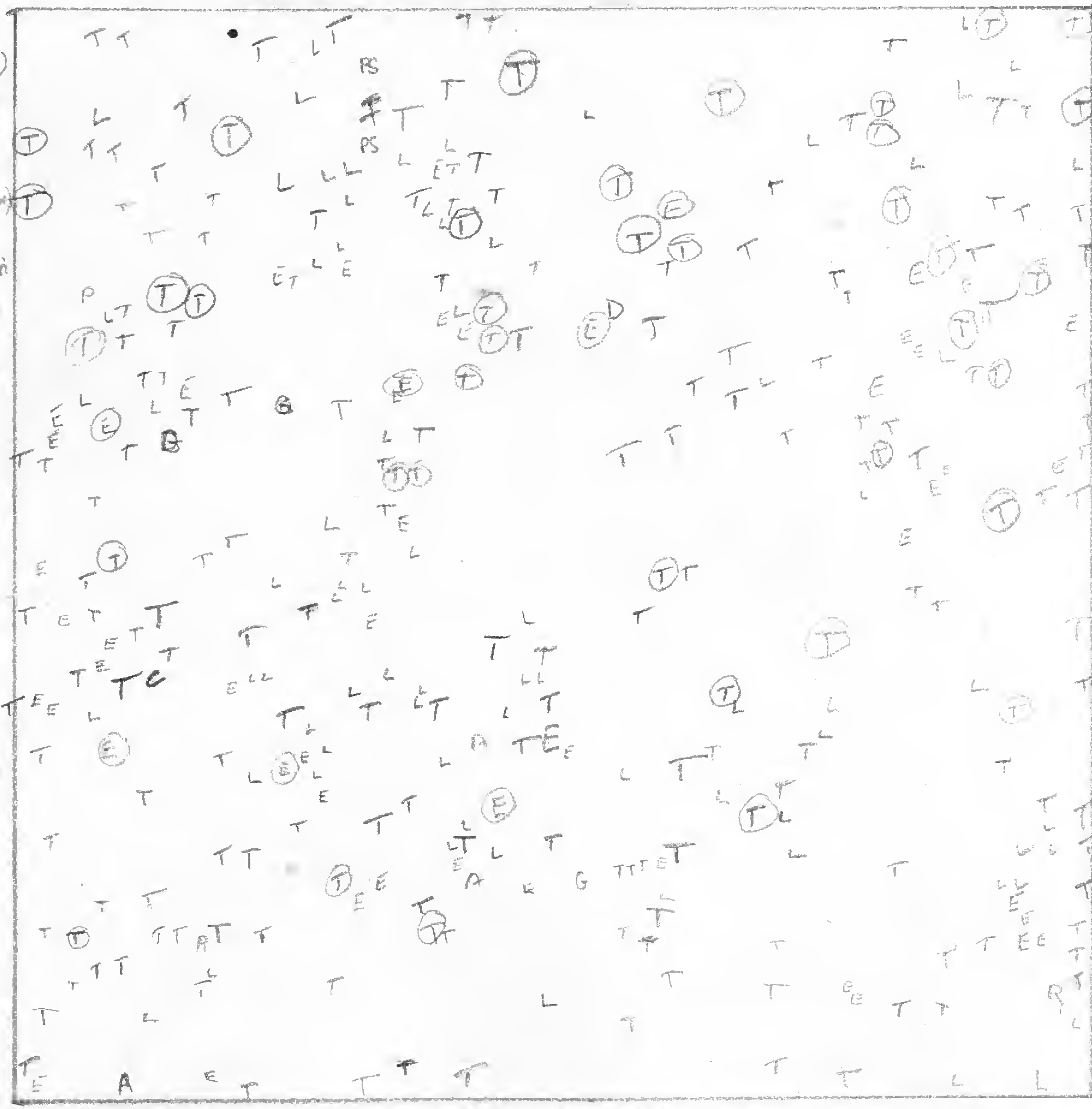
Copper Carbonate	1/20 lbs.
Ammonia solution	1/5 gallons.
water	4 gallons

Mix perfectly both Copper Carbonate and Ammonia solution in a bottle. after keeping for 15 minute, drop it in 4 gallon water with stirring lightly. Apply it with sprayer and need to stir it occasionally.

B.8.3/34

3 FOOT QUADRAT No. 2. SCALE 1/6

N.



OBSERVATION (ONLY)

ABBREVIATIONS

T Tridax procumbens
L Small Labiate (? Hyptis)
E Emilia sonchifolia
A Eragrostis elongata
R Rush (Juncaceae)
G - Grass (Gramineae)
C - Convolvulus sp
P - Phyllanthus Niruri
PS - Passiflora foetida

A ring ○ round a symbol denotes that that particular plant was flowering at the time of the observation

17.2.32.
G.D.S.

ENVIRONMENT. T. at its thickest, with many long runners.
C. few plants with long ~~flowers~~ stems bearing many flowers.
Sandy soil, very dry, in Fomes area; slope to S. Nearest trees 100 feet.

containing Iridaea at its thickest.

3 FOOT QUADRAT. NO. 2. 17th March 1932

OBSERVATION (ONLY)

Part of the rubble estate devoid of trees which have been killed by Fomes lignosus. Once weeded once in two months when only tall herbs, Lalang grass, and seedling trees are taken out. Height 50'.

Surrounding

Area bare of trees, quadrangular, 6 acres in extent, lying halfway down a South slope. The quadrat was taken where Iridaea procumbens grows thickest in sandy soil, very dry and subject to rain wash. Open to sun during the whole day; a few rubber seeds and leaves on surface.

Around the quadrat with 20 feet are, stolons of Lalang, Emilia sp, several grasses, Paniflora sp, Oldenlandia dichotoma, Convolvulus sp. Nanonia sp. (many plants), Hedyotis pinifolia, Erechtites valerianifolia, several ferns (Adiantum), rubber (in fallen stumps).

North boundary of quadrat is a nearly dry drain running on centre of hill

Remarks.

T - Iridaea procumbens, the dominant, produces very long runners (18 inches or more) and is very weak, consequently covers the quadrat to a greater extent than appears on the plan. Few plants only, flowering (T), though many have recently shed seed.

E - Emilia sonchifolia, few plants, very weak, flowering with many small seedlings.

L - A small Labiate 2 inches high (? Hyptis sp); nearly all plants in flower and (many seedlings with only 2 or 3 leaves are flowering)

C - Convolvulus sp - long trailing stem (<3ft); many flowers.

G - Several species of Graminae, not identified, all with long runners, covering several square inches of ground.

BB-3/35

Tridax procumbens L.

Weed prostrate in dry open spaces, never under rubber nor where shade of trees stays for more than an hour.

Found in only two spots, both very similar. Abundant there but definitely confined to sunny areas ~~only~~.

Flowers yellow. Fruits dispersed, not far by wind, Found in flower in July, January, February, March April May.

B8·3/36

T

G 17

DRAFT

Fair Copy }
Signed by }

19 .

To

S. nobilis Sm.?

Sir,

Sterculia balanghas

This species, native of India and southern China, said to be distributed

is cultivated by ~~Chinese~~ Cantonese for its large seeds which are said to be of excellent quality.

NB. hence S.Q. Wong, Cavin hill circle brought a plant from Canton 1925. Grew well & in 1939 a tree 15 ft or so; fruits about twice a year but not heavily. Leaves glabrous. Infl. with stiffly hairs; plus fruits. Fruits not very showy, ~~[illegible]~~ short-hairy. Seeds large, completely filling fruit cavity, testa ~~black~~, brown-black, shining. Seeds said to be good to eat when steamed.

Not mentioned as ~~[illegible]~~ occurring in Java. ~~[illegible]~~ In Ceylon* said to be commonly planted. *Lewis "vegetable products" [illegible] said to be useful; no mention of edible seeds. In Siam Craib says commonly planted. In Indochina (Lecomte

BB-3/37

Uses name nihilist : says nothing about [illegible] said

[illegible] says inspired to [illegible] every

year [illegible] to take on the day of the [illegible].

ad lit. Biological Abstracts vol.5,1931

10421. CAMMERLOHER, H. Blütenökologische Beobachtungen an den Blüten einer Bauhinia. (Floral ecology of Bauhinia.) Bul.Fac.Stiinte Cernauţi 3 (1/2): 171-174. 1 pl. 1929.- When the flowers of B.scarlatina open, the petals are yellowish-orange. Anthers open with a pore in each half of the anther, and the pollen is extruded in a liquid which attracts ants. During anthesis the color of the petals changes to fiery red. The pollinating agents are probably birds or Lepidoptera seeking nectar.

B2-3/38

p.101 Die Pollenkörner insektenblütiger Pflanzen zeigen die verschiedenste Gestalt; sie sind glatt oder mit wabiger Oberfläche oder mit Stacheln versehen. Oft ist die gesamte Pollenmasse zu einem einheitlichen Körper, Pollinium, vereinigt, wie bei den Asclepiadaceen oder Orchideen (Fig.39). Fast durchwegs zeigt aber der Insektenpollen eine gewisse Klebrigkeit, wodurch er beim Aufreiszen der Antheren nicht ausfällt, sondern an den Valven haftet und sowohl am Körper der besuchenden Insekten als auch an den Narben in ganzen Klümpchen angeklebt wird. Dieser ölige Klebstoff, den K n o l l (1930, S.611) als P o l l e n k i t t bezeichnet hat, ist seiner chemischen Beschaffenheit nach derzeit noch unbekannt. Meist ist er dünnflüssig, manchmal ist er fadenziehend (Oenothera), so dasz zwischen den einzelnen Pollenkörnern lange, dünne Fäden ausgespannt sind. Gelegentlich tritt
p.102 dieser Klebstoff als einheitlicher, farbloser Tropfen aus der Anthere, in dem dann die gesamten Pollenkörner enthalten sind und der als Ganzes von besuchenden Insekten weggetragen wird, wie dies bei Bauhinia scarlatina beobachtet wurde (C a m m e r l o h e r 1929 b, S.172). Gewöhnlich ist aber diese Klebmasse gelb gefärbt, welche dadurch, wie früher schon erwähnt, mit die Ursache für die Gelbfärbung der Pollenkörner ist. Auszer der Bedeutung, die dem Öl wegen seiner Klebrigkeit zukommt, erörtert K n o l l (1930, S.669) aber auch noch andere Möglichkeiten ökologischen Wertes. So hält er es für wahrscheinlich, dasz der Duft, der manchem Pollen insektenblütiger Pflanzen eigen ist, seinen Sitz in dem die Pollenkörner umhüllenden Öl hat. Und da die Farbe des Öles meist helb ist und dadurch auch dem Pollen die gelbe Färbung verleiht, so kommt jenem auch eine gewisse Bedeuting bei der optischen Anlockung der Insekten zu. Als Nährstoff für polpenfressende Insekten scheint dieses Öl aber nicht in Betracht zu kommen.

From H. Cammerloher: Blütenbiologie I. 1931.

B8-3/39

p.123 p.124

F a r b e n w e c h s e l der Blüten während des Blühens ist mehrfach beobachtet worden. So zeigen die Blüten von Symphytum officinale oder von Myosotis zu Beginn der Anthese hellrote Färbung, während sie später blau sind. Diese Veränderung beruht auf einem Wechsel in der Reaktion des Zellsaftes. Bei Bauhinia scarlatina erscheinen die Blüten beim Aufblühen in einem prächtigen Orange, das mehr ins Gelbliche hinüberspielt. Im Verlauf der Anthese verändert sich dann die Farbe der Blütenblätter; sie werden feurigrot. Untersucht man die Blütenblätter im Querschnitt, so sieht man, dasz, solange sie gelb sind, sie sowohl in der oberen wie unteren Epidermis zwar hellroten gelösten Farbstoff enthalten, in den Zellen der oberen Epidermis aber auszerdem noch grosze gelbe Chromatophoren. Daher erscheint auch in diesem Zustand die Unterseite der Blütenblätter immer in einem gesättigteren, ins Rötliche spielenden Orange, während die Oberseite einen mehr gelben Ton zeigt. Im roten Zustand der Blütenblätter ist der rote Farbstoff in der oberen und unteren Epidermis im Ton viel tiefer und hat auszerdem einen leichten bläulichen Stich. Die gelben Chromatophoren in den Zellen der oberen Epidermis sind zwar vorhanden, aber von dem satten Rot ganz überdeckt und kommen kaum zur Geltung. Da die Unterseite der Blütenblätter ziemlich dicht behaart ist, ist die Farbe auf dieser Seite etwas matter.

So wie B.scarlatina scheint sich hinsichtlich des Farbenwechsels auch B.Bongardi zu verhalten, von der L i n d m a n (1902, S.19) angibt, dasz sie "nach dem Verblühen" purpurrot wird.

Ein auffallender Farbwechsel tritt nach W i n k l e r (1906, S. 254) bei den Blüten von Helicteres isora ein. Am ersten Tag der Anthese ist der Kelch grünlichgelb und ebenso auch die Blumenblätter in ihrem unteren Drittel, das durch schwärzliche Drüsen schmutzig aussieht. Die beiden oberen Drittel der Blütenblätter zeigen dagegen ein zartes, dunkles Graublau. Der Androgynophor ist hellgelb, nach oben zu mit braunen Drüsen besetzt und hinten rosa überhaucht. Am Nachmittag des ersten Tages der Anthese geht das Graublau der Blütenblätter allmählich in Violett über. Dann wird der Kelch nach und nach rein chromgelb, und gegen Abend ist das Violett der Blütenblätter in Rot umgeschlagen. Am zweiten Tage der Anthese sind die Blütenblätter fleischrot mit einem feinen Stich ins Violette. Die schwarzen Flecken an ihrer Basis sind in Braun übergegangen.

Für die Änderung der Vlütenfarben sind nach W e i s z e (1923) vor allem das Licht und die Temperatur ausschlaggebend; doch können die oben angeführten Veränderungen bei Bauhinia und Helicteres kaum so erklärt werden. Nun hat M o l i s c h (1930 a, S.80 ff.) in Indien an einer Reihe von Blüten Farbenänderung während der Anthese festgestellt. In den meisten Fällen tritt ein Umschlagen von Weisz in Rot auf (Hibiscus mutabilis, Capparis horrida, Quisqualis indica, Datura metel). Bei anderen Blüten ändert sich das Weisz in Gelb (Brunfelsia spec.) oder Blauviolett in Weisz (Francisoea latifolia)oder Gelb in Lachsrot (Hibiscus tiliaceus). Die Farbenändrung von Weisz in Rot tritt aber nur bei Gegenwart von freiem Sauerstoff ein. Werden zum Beispiel noch weisze Blüten der angeführten Arten unter Wasser gehalten, wodurch der Sauerstoff der Luft algeschlossen ist, so bleiben sie weisz, während Kontrollblüten bereits die rote Färbung angenommen haben. Wird dem Wasser aber Wasserstoffsuperoxyd beigefügt, so tritt auch bei den unter Wasser gehaltenen Blüten die Umfärbung ein. Es ist nach diesen Versuchen für die Entstehung des Anthokyans der freie Sauerstoff notwendig.

p.125

Fran M. Cammerloher. Blütenbiologie I. 1931.

BK 3/40

T

G 17

DRAFT

Fair Copy
Signed by }

19 .

To B. americana var. Penang 90/35 Flowers as large as ~~americana~~ undulata but ~~calyx~~ calyx smaller (½ size), not bigger than americana. ~~Supposed to say flowers open yellow or turn white. Old flowers white anyway.~~ Flowers open white & turn slightly yellow. ± intermediate bet. undulata & americana. apparently not-setting.

Sir,

Brunfelsia

1. B. americana. The common sp. Flrs open white in the evening, v. fragrant, turn pale yellow. Leaves broad-ended  but pointed. Flrs with petals only slightly undulate, sets fruits freely. Recd. also as B. Sieberi from Saigon.
Hab. T. America (Bailey)

2. B. undulata. Recd from Hong Kong as B. americana. Flowers open white and remain so. Larger than those of B. americana, edges of petals much undulate; ~~leaves~~ does not set fruits. Leaves longer & relatively narrower, much more narrowed to apex. Hab. Jamaica Bailey.

3. B. calycina. Flrs opening in light violet-blue, fading ± white. Calyx inflated with rather long broad teeth, equal.

B. eximia Bot. Mag. 4790. ~~tab~~ Flrs much as B. calycina (corolla). Calyx pubescent, not-inflated, teeth short-acute slightly incurved, & longer slit between 2 of the teeth so that the calyx is spathaceous. (var. of calycina in Bailey).

B8·3/41

I do not think we have this.

T G 17

DRAFT

Fair Copy
Signed by

19 .

To

Sir,

Solanum Wrightii 35737, p. Cinnamon is identical with our plants hitherto known as S. macranthum described by Bentham in H. Stapley

S. Wrightii is an introduced plant in dry Kew.

In Index Kewensis S. macranthum Dun. from Brazil

S. macranthum tab. 4138 Bot. Mag.

Bras. is said to be S. maranense, not macranthum

and S. macranthum Hort. ex Carr. in Rev. Hort. 1867 p. 132 and ic.
= S. Wrightii

Our plant is different from Bot. Mag. 4138 having longer narrower calyx less deeply lobed smaller & ? diff. stamens.

B 8·3142

PROPAGATION

Various methods have been tried for the following plants. The results are as follows:-

Bougainvillea glabra magnifica.

Very thick cuttings given the usual treatemnt will root with difficulty.

Cuttings the thickness of a pencil will occasionally root in water.

The most effective method of propagation so far is to take cuttings of ripened wood leaving one leaf and put them in a pot in a bell jar. The extra heat is condusive to good root formation. Rooting by this method takes place in 4 to 6 weeks. It has been noted that if a leaf is left on the cutting roots form before shoots appear above soil level. If all the leaves are removed the cutting shoots from the top without having roots beneath.

Grafting was unsuccessful. Some approach grafts have been started but have only been on a comparetively short time. Budding and grafting might be successful with a little heat.

Boug. Amarault, B. Hida, and B. Mrs. Lancastor will root easily from half ripe heel cuttings.

Amherstia nobilis and Brownea.

Several layers have been put down but have not yet had time to be effective.

Chonemorpha penangensis

Roots fairly readily if the leaves are removed.

Odontadenia speciosa

The only successfully rooted cuttings obtained were from very thick ones that were placed in a sand pit in the orchid house. Rooting took place in 5 weeks.

Rondeletia odorata

Roots with difficulty in the ordinary way, roots fairly easily in a sand pit.

B8-3/43

Ravenia spectabilis

Will not often root by cuttings treated in the ordinary way. Those placed in a bell jar have calloused well and will probably root at a later date.

Warscwiezia coccinea

Cuttings in a bell jar have calloused but not yet rooted.

Pandorea jasminoides and P. pandorana

Root quite easily in a sand pit from fairly thick cuttings. Layers very easily.

Stephanotis floribunda

Roots easily under a bell jar, especially if the cuttings are taken with a heel.

Ureskinnera spectabilis

Green cuttings will root but take rather a long time.

Podocarpus polystachys

Roots from cuttings placed in sand but takes two to three months.

Nerium Oleander

Roots quite easily if struck in a sand pit.

Bauhinia Kochiana

Layers have been put down but have not yet had time to show any results.

Conclusions

From the success with the bell jars it can be taken that most of the plants that are rather difficult to propagate will root easily with a little extra heat.

On the whole it is advisable to leave one or two leaves per cutting.

Sand pits are most useful, comparetively little fails in them, those under cover being the most effective as watering cannot be controlled in those outside and also there is great damage done by insects.

A good rooting medium is a mixture of half sand and half coconut fibre.

B8-3/44

E.D.B.

BELVITAN

A Hormone preparation for promoting root growth on cuttings.

Experiments were carried out in January to ascertain the efficiency of the Belvitan paste and solution. The subjects used included those that are very difficult to root and others that are fairly easy.

Belvitan Paste

Was applied to opposite sides of the base of the stems (chiefly soft wood cuttings) over a distance of about $\frac{3}{4}$" and the cuttings placed in pots in the usual way. Those so treated included - Jasminum Rex; Bougainvillea glabra magnifica, Bauhinia kochiana, Rondeletia odorata, Pandorea pandorana, Chonemorpha penangensis, Odontadenia speciosa, and Ureskinnera spectabilis.

The results were disappointing as the cuttings all died with the exception of the Ureskinnera, these produced roots but did not grow as rapidly or look as healthy as the controls.

Controls were set up at the same time, some of the following rooted - Jasminum Rex, Pandorea pandorana, Chonemorpha penangensis and Ureskinnera spectabilis.

Belvitan Solution

The dose used for this experiment was no. 3 one phial to a quart of water.

The cuttings were placed in jars in which there was an inch and a half of solution. One batch was left for 24 hours and the other for 48 hours. The cuttings treated were as follows - Chonemorpha penangensis, Petraea rugosa, Podocarpus Rumphii, Odontadenia speciosa, Warscwiezia coccinea, and Rondeletia odorata.

After being in the solution for the alloted time the cuttings were rinsed in clean water and potted up in the usual way.

A similar number of controls were set up at the same

time.

The first noticable effect was that the leaves died within 24 hours with the exception of Petraea rugosa which remained green for about ten days but the cuttings finally died. The only plant which gave positive results was Chonemorpha penangensis, which had been in the solution for 18 and 24 hours. The leaves died within 24 hours, growth however started above soil level within 8 days. The cuttings were well rooted within three weeks. The controls of the latter took longer to show top growth but were nearly as well rooted. This was the only control that rooted.

Conclusion

Little is to be gained by the use of Belvitan solution or paste when used as above.

E. D. H. Brown

HIBISCUS PROPAGATION

Budding and Grafting.

Cuttings were taken 4' in length of Hibiscus rosa-sinensis to act as stocks, which when rooted were potted up and immediately shield budded with different large flowered varieties.

A similar number of stocks were grafted.

The results were on the whole disappointing, many of the buds or grafts started into growth but subsequently died. This was often due to the failure of the stock, the roots of which had rotted shortly after being potted up.

To insure success the stocks should be struck in a sand bed (where they produce a greater number of roots) and potted up in a very open compost, great care being taken to insure perfect drainage. Budding or grafting should not be carried out until it can be seen that the stocks are really well established in their pots or in the open ground.

All growths below the bud or graft should be removed.

Do not remove the wood from the back of the bud as it causes it to dry out.

The following Hibiscus have shown that they can readily be grafted - nos. 27, 44, 51, 55, and 63.

Grafting appears to be more satisfactory than budding.

Seed.

Nearly All the numbered varieties of Hibiscus were tried as seed parents using H. schizopetalus as the pollen parent.

Most varieties produced a fruit, but not all produced seed that matured.

The varieties that produced fertile seed were as follows - nos. 10, 18, 20, and 34. Other varieties that produced half grown fruits were as follows - nos. 3, 17, 52, and 70, these would probably set seeds if persevered with for a time

B8·3/47

The best time for pollination is in the early morning when the flowers have just opened, the weather should not be wet. Trouble was experienced with caterpillars boring into the half grown fruits, this was eventually controlled by removing all the leaves that could touch the fruit as it was coticed that the caterpillars stuck the leaf to the fruit and used it as a shelter.

The seeds when ripe were dried off for a day or so and then sown. The resulting seedlings show great variations in the shape of their leaves. The varieties that produced the greatest number of fertile seeds were nos. 10 and 34.

Hibiscus schizopetalus was pollinated by H. 63 but no fruits were produced, possibly the style in H. schizopetalus is too long for the pollen tube of 63. A more positive result might be obtained if the style was shortened and the cut surface used as the stigma.

E. D. H. Cramer

Bougainvillea pollination

formosa × magnifica
× Mrs Butt

magnifica × formosa
× Mrs Butt

Sanderiana × Mrs Butt

no seeds

pollinated at all hours

many times.

N.B. examine pollen: germination hard wear

SEEDS etc.

Many seeds of plants not usually grown here have been sown. The germination on the whole has been good, the following are of special interest.

Drosera

D. Capensis and D. spathulata were sown in small pots which were kept continually standing in water. When the seedlings were large enough they were pricked out into a mixture of brick dust and coconut fibre or sand and finely chopped sphegnum, the plants in both composts are growing quite well.

Begonia

Many species of Begonias have been sown, the germination of which on the whole were good. As soon as large enough the plants were pricked out, and after a few weeks transfered to Spathoglottis pots using a very well drained compost and a ring of broken brick round the collar to prevent rot.

It was noted that seeds from two different firms labelled B. Hirtella have produced two distinctly different types.

B. luxuriens is growing slowly it was very inclined to to damp off in the earl stages, but when treated as above started into growth.

Streptocarpus

Of various kinds have been sown, the germination was good and many of the varieties have been pricked out but are not yet large enough to be transfered to small pots.

Ceropegia

Several Ceropegias have been planted, only two have shown any signs of groth viz. C. bulbosa and C. Woodii.

E. D. H. Barnes

B&S/29

Propagation of tropical plants at Edinburgh

notes made in 1934

1. Coir dust is kept loose, & surface loosened frequently
2. Glass over kept shut except an hour each evening,
3. No leaves removed from cuttings. Cuttings pushed in by hand.
4. Laticiferous cuttings: lay on top of frame and remove exuded latex from time to time until no more exudes.
5. Pith plants: take internodal cuttings where the pith is necessary, or heel cutting, for same reason.
6.

Temperate plants

Sand alone) or ground pumice for plants which will not stand too much moisture
Potassium permanganate watered in twice a week as fungicide.
Acetic acid not required for acidity.
Water from above, not from below.

T

M E O 15

DRAFT

Fair Copy
Signed by

19 .

To

Sir,

A Squirrel Pest

Calophyllum inophyllum, Linn., is a large tree common in the Malay peninsula both in the cultivation as a shade or ornamental tree, or in the wild state in the coastal forests. It belongs to the Guttiferae, a family which is characterised by the presence of Gutta or a gummy resin in the stem, and also in leaves or fruits, and which includes many trees of commercial or economic importance such as the Mangosteen, the Ceylon Gamboge, and the Iron-wood. In English this tree is known as Alexandrian Laurel, the general Malay name in the peninsula is Penaga laut, which is derived from its Sanskrit name Punnaga, the adjective laut being usually suffixed to show that the tree is an inhabitant of the littoral parts of the peninsula. Pudek is, as far as I have been able to trace, its especial vernacular synonym in Malacca. The tree has no regular fruiting seasons in the peninsula, but, in India where the tree is also wild and cultivated, its fruits may be obtained in February or somewhere in August. It produces round, marble-like fruits containing a large percentage of oil which does not play any part in the local industries as it does in some parts of India, where the oil — the Laurel or Domba oil of commerce — is used in medicinal confections and for illuminating purposes. For a detailed account about the nature of this oil the reader may consult the Pharmacographia Indica Vol. I(1889) 173, by Dymock, Warden and Hopper, and Lewkowitsch's Chemical Technology and Analysis of Oils, Fats and Waxes, Vol. II(1914) 369. The cake left after the expression of the oil is a very rich nitrogenous manure for crops. However both the oil and the cake are unfit for edible purposes as they contain a very poisonous element.

Yet however it is not uncommon to find in their fruiting seasons here, the ground below these trees littered with numerous partly eaten fruits. A closer inspection about shows the author of the damage to be a squirrel — the tupai of the Malays

which carries on its activities up on the tree. This squirrel plucks the fruit with its fore-legs, nibbles off an opening through its various layers and eats the tender embryo, and probably also sips the sweetish, astringent liquid within the central(nucellar) cavity of the fruit.All the bits it nibbles off in order to get at the embryo it throws away, and it discards the fruit also immediately after the removal of the embryo. Apparently it does not relish any other portion of the fruit. I have observed a squirrel which had not satisfied its appetite, though it had eaten embryos of more than thirty fruits in rapid succession.

The fruits attacked are about 2 cm. in diameter with a nucellar cavity of about 1 to 1.5 cm and an embryo 0.2 to 0.4 cm. long respectively. Smaller fruits have none or very little in the shape of embryo. Larger ones have a harder shell with plenty of yellowish, sticky resin in the tissues outside the embryo, so that the squirrel probably finds not only very difficult to bite at the shell but also very dangerous since the poisonous principle is found both in the oil and the resin. The fruits attacked may have also the poisonous principle in the tissues enveloping the embryo, but since there is no gummy resin to stick to its mouth and since all the parts gnawed are thrown away, the squirrel does not suffer any harm. It is noteworthy that the squirrel is very expert in judging the right kind or size of the fruits it can deal with without any harm, for inspite of my numerous observations made during two fruiting seasons of each of the two trees in the Botanic Garden, Singapore, I have not seen a single instance where the tupai had to discard a fruit because of its failure to judge the size or the development of the fruit correctly.

The squirrel that derives so much benefit from the Penaga laut trees in the Botanic Garden, Singapore, is Sciurus notatus singaporensis,Robinson .

It may be mentioned that the fleshy rind outside the hard shell of the fruit is harmless, at least this is so when the fruits are mature. This property of the rind is taken advantage of by a

large bat commonly known as flying-fox which visits the trees in the dusk in large numbers. In eating the rind, the bat seldom does any damage to the germinative power of the seed; on the contrary the seed without the rind seems in some cases to germinate better than the one with the rind. Often the bat carries the fruits at a considerable distance from the tree before it eats the rind and discards the remaining fruits of the fruits. In view of this the bat may be said to do some beneficial service to the tree in return to what it gets as a food; for, unlike its confrere the squirrel which tends to restrict the tree's progeny as much as it can by eating the germs in the seeds, the bat exerts an influence which facilitates the spread distribution of the tree to a larger area, and in some cases increases the chance of germination.

(or 40)

25 Watt Lamps 4 ft apart -
30 inches from plants

with suitable reflectors,

Aluminium "pie tins" [illegible] reflectors

G. H. Poesch - Alex Laurie
The Use of Artificial Light in
Reduction of the Daylight period
[illegible] plants in the
Greenhouse.

Ohio Agr. Exp. Sta.
Bull. 559 Nov. 1935